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JULY 1954

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ENTOMOLOGICAL NEWS

VOL. LXV JULY, 1954 No. 7

My Last New North American Fleas

By C. ANDRESEN HUBBARD, Tigard, Oregon

The fleas listed here as new, bring to 50, the number described by the writer and clears from his desk the accumulation of odds and ends through the years. The types are all deposited in the U. S. National Museum, first paratypes in the British Museum.

Thomomys and the **Dactylopsylla**

Investigators realize the almost endless variety found in western pocket gophers. Hall mentions 38 from Nevada, Bailey 15 from Oregon, around 10 are recorded from Washington. Their giant fleas (*Dactylopsylla*) are almost as variable. *D. comis,* the first of these northwest giants to be described, ranges everywhere in the Cascade Mountains and east in Oregon and Washington. West of the Cascades one finds a variable series in which the differences are to be found in the breadth of the VIII St. male, its apical angle, shape of its membranous appendage; and apical outline of VII St. female. The four listed below as new are all between 4 and 5 mm. in length.

Dactylopsylla comis scapoosei new subspecies

Closest to *D. c. comis* but with VIII St. male very narrow, apical angle rounded but very flat and membranous flap approaching the rectangular. VII St. female generally without undulations. Types were taken off *Thomomys d. douglasi* (type host) at Scapoose, Columbia County (type locality), OREGON on May 8, 1951.

Dactylopsylla comis tacomae new subspecies

Like *D.c. comis* but with VIII St. male apically angulate the angle obtuse, the membranous flap large, bulbous in outline. VII St. female without undulations. Types were taken at Tacoma, WASHINGTON (type locality) off Tacoma pocket gopher (type host) on February 26, 1951.

Dactylopsylla comis walkeri new subspecies

Like *D. c. comis* but VIII St. male with acute apical angle, the membranous flap small and circular in outline. VII St. female with posterior squarish lobe. Types were taken at Wedderburn, Curry County, OREGON (type locality), off *Thomomys m. helleri* (type host) on September 18, 1949. This flea bears the name of Professor Kenneth Walker of Puget Sound College, Tacoma, Washington, long time friend of the writer.

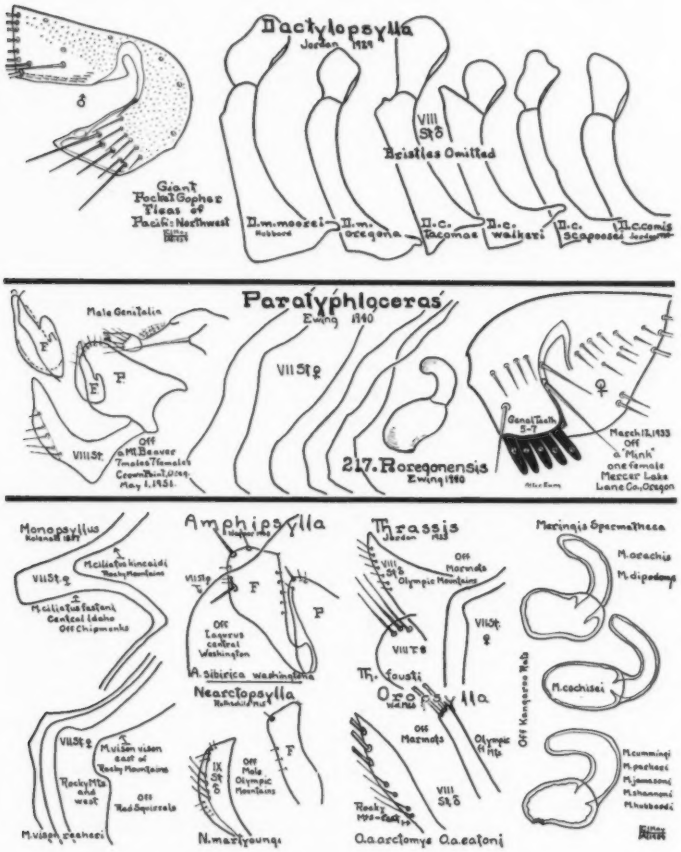
Dactylopsylla moorei oregona new subspecies

Close to *D. m. moorei* from southwest Washington and separated from the range of the parent by the great Columbia River. Found in the northwest section of Oregon the new subspecies differs from *D. M. moorei* in that VIII St. male is narrower, the apical angle apically rounded flat, with very much smaller membranous flap and somewhat circular in outline rather than rectangular. VII St. female variable, with or without squarish posterior lobe and concave dorsal margin. Types were taken at Devils Lake, Lincoln County, OREGON (type locality) off *Thomomys hesperus* (type host) on September 8, 1949.

Lagurus and **Amphipsylla sibirica**

There appears in February on *Lagurus* at one location in central Washington a small number of fleas close to *A. s. pollionis*. The writer found one male and one female only during 1949, 1950, 1951, sorted out of hundreds of other *Lagurus* fleas from the same locality west of the Columbia River. *Lagurus* taken east of the river did not carry the flea. Since the Washington form is separated from *A. s. pollionis* of Alberta, Canada by two natural barriers, the Columbia River and the Rocky Mountains

and since differences between the two have been called to the attention of the writer by Dr. Karl Jordan, he here establishes.



Amphipsylla sibirica washingtona new subspecies

Close to *A.s. pollionis* but with these differences: Male: Frons not so strongly curved in upper part. Spinlets on abdominal terga 3,4,3,1,1. Hind tibia on outer surface with 12 subdorsal

lateral bristles, on inner surface an oblique row of 6. VIII St. with a longitudinal row of 5 long bristles. Dorsal margin of finger and especially upper posterior angle more rounded and the two spiniforms nearer together. Apical ventral sclerite is straighter and the bulbous tip is more abruptly curved upwards. Female: Apical margin of VII St. undulate, armed with 5 major, 4 medium and 6 small bristles to the side. Types were taken at 18 miles east of Ellensburg, WASHINGTON (type locality), off *Lagurus curtatus pauperrima* (type host) on February 6, 1951.

The Allotype Male of **Paratyphloceras oregonensis** Ewing

This, the mystery flea of the far West, was described by Ewing in 1940 from a single female taken off a mink at Mercer Lake, Lane County, Oregon on March 12, 1933 by H. H. Stage. The writer suspected the flea to be off *Aplodontia* but over a period of 40 years and hundreds of Mt. Beaver records had never taken it. On May 1, 1951, six *Aplodontia r. rufa* were taken by the writer at Crown Point, Oregon. Five were without fleas but the sixth carried 14 which upon examination proved to be 7 males and 7 females of *P. oregonensis,* the first ever seen by the writer. The pattern of the male genitalia now available; the writer places the genus between *Rectofrontia* and *Actenophthalmus* with the male suggestive of *R. fraterna* and *A. heiseri,* and is described as follows. Process large, well rounded and entire. Finger small in comparison to P., slender, apically rounded to pointed, extending to apex of P. with unusually large articulating surface with P. and armed posteriorly with several small bristles. VIII St. hooked (like regular logging dog), vertical arm with many posterior bristles. Pygidial area similar to *Micropsylla.* Female VII St. entire, high and undulate in outline. Spermatheca similar to *R. fraterna* but with more barrel shaped body. Genal teeth vary from 5 to 7 in this flea and fifth segment of tarsus II with 5 pairs of lateral plantar bristles, fifth segment of tarsus III with 6 pairs. Types bear writer's number 2800.

Olympic Mountains of Washington

For a number of years Dr. Murray Johnson, physician and surgeon of Tacoma, Washington has been the leading naturalist in the Olympic Mountains. From the many fleas sent to the writer by him the following three are now described as new.

Oropsylla arctomys eatoni new subspecies

Close to *O. a. arctomys* Baker but with following differences. Male: Finger narrower, proportions different; acetabular above lowest point of anterior margin of F. and posterior margin of P.; additional bristles present; VIII St. with only 3 major bristles close to apex. Female: VII St. entire, a squarish lobe in outline; spermatheca with body smaller, less rounded, tail longer. Types were taken off *Marmota olympus* (type host) in Olympic National Park, WASHINGTON (type locality) on August 12, 1951. This flea bears the name of Mr. Alden Eaton, late of Seattle, long time friend of the writer and victim of heart disease at 45.

Thrassis fousti new species

In the writer's opinion this flea lies midway between *Th. acamantis* Roths. and *Th. spenceri* Wag. with male genitalia being proportioned between the two, and in the female VII St. being entire and squarish. Types were taken off *Marmota olympus* (type host) in Olympic National Park, WASHINGTON (type locality) on August 12, 1950. This flea bears the name of Mr. Guy E. Foust, late of Sacramento, California, brother-in-law of the writer and victim of heart disease at 50.

Nearctopsylla martyoungi new species

Close to *N. hyrtaci* Roths. but with following differences: Male. Pronotal comb more strongly curved, spines greatest so far found in genus, totaling 39; Pronotal area from comb to base almost as wide subdorsally as the subdorsal spines are long. Bristles on abdominal tergites more numerous; tergum VII sinus extends only half so deep and at its margin there are about a dozen bristles arranged in two irregular rows; Process and

finger nearly the same; manubrium not so narrow towards the tip; posterior margin of dilated upper end of vertical arm of XI St. more evenly convex, ventral arm very much broader. The female is unknown. Dr. Karl Jordan has supplied the above differences. The holotype male (only specimen) was taken off *Scapanus townsendi* (type host) on Hurricane Ridge, Olympic National Park, WASHINGTON (type locality) on August 12, 1950. This flea bears the name of Mr. Martin Young, late of Portland, Oregon, cousin of the writer, a Marine flame thrower who in a voluntered mission to burn out a Japanese pill box accomplished the mission on the Island of Guam at the cost of his life.

Western Squirrels and **Monopsyllus**

The writer has before him two fleas of western squirrels which he considers new, the first to be called

Monopsyllus ciliatus fasteni new subspecies

Close to *M. c. kincaidi* Hub. but differing from it and all other ciliatus in that the VII St. female is with a broad rectangular lobe suggestive of the *M. eumolpi* complex. The male is unknown. The types were taken off a chipmunk (type host) 10 miles north of Potlatch, Latah County, IDAHO (type locality) on July 22, 1945 and bear the writer's number 2506. This flea bears the name of Dr. Nathan Fasten, Seattle, Wash., major professor of the writer while at the University of Washington.

Monopsyllus vison reeheri new subspecies

This is the form of *M. vison* found west of the Rocky Mountains. The writer has collected it in Idaho, Washington and Oregon. The constant difference is in the VII St. female which is entire and squarish in apical outline. The types were taken at Hepner, OREGON (type locality) (western limit of type host range) off *Tamiasciurus h. richardsoni* (type host) on June 15, 1950 and bear the writer's number 2760. This flea bears the name of Mr. Max Reeher, federal entomologist at Forest Grove, long time friend of the writer.

A New **Meringis** from the Southwest

The writer has before him specimens of *Meringis arachis* Jord. from all over its range and a small series close to it but differing in the female which shall be called

Meringis cochisei new species

The male of the new species is similar to *M. arachis* but in the female the spermatheca is differently shaped from all described *Meringis,* being elliptical. The types were taken off Hog-nosed Skunk (true host probably *Dipodomys,* the skunk its predator) in Baboquivari Mountains, ARIZONA (type locality) on January 16, 1931. The flea bears the name of the famous Indian Chief Cochise who ranged through the type locality and left his name on many natural objects in Arizona.

Nomenclature Notice

All comments relating to the following proposals should be clearly marked with the file number and should be in the hands of Francis Hemming, Secretary, 28 Park Village East, Regent's Park, London N.W.1, England before November 11, 1954.

Details on the following are in *Bull. Zool. Nomencl.* Part 6, Vol. 9:

immigrans Sturtevant 1921, as in *Drosophila immigrans,* proposed validation of (pp. 161) (File Z. N. (S.) 711).

pruni Geoffroy 1762, as in *Aphis pruni,* proposed validation of (p. 163) (File Z. N. (S.) 428).

Lachnus Burmeister 1835, and **Cinara** Westwood 1835, proposed designation of type species (p. 174) (File Z. N. (S.) 174).

In Part 7 of Vol. 9: **Melanargia** Meigen 1828, proposed validation of (p. 221) (File Z. N. (S.) 708).

In Part 8 of Vol. 9: Geoffroy 1762, *Historie abrégée des insectes qui se trouvent aux environs de Paris,* proposed validation of the following six names published in, for genera: **Stratiomys, Stomoxys, Volucella, Nemotelus, Scatopse, Bibio** (p. 241) (File Z. N. (S.) 710).

Ratios as a Means of Specific Differentiation in Collembola

By KENNETH CHRISTIANSEN, American University of Beirut

It has long been customary to use organ-length ratios as characteristics in separating Collembolan species. In the course of preparation of a forthcoming revision of the Nearctic *Entomobrya,* a large number of measurements were taken, transformed into ratios, and treated statistically.

In all of these ratios the overall size of the individual (less the intersegmental membrane areas) was taken as the denominator and the length of one of twenty-two different organs taken as numerator. These organs were: left antennal segments, head length, thoracic and abdominal segment lengths, manubrium, dens, left femora 1 and 3, left tibiotarsi 1 and 3, left ungues 1 and 3, and left empodial appendages 1 and 3. Following Jeannenot [3] the ratios were considered as following a normal curve distribution and the standard deviation and error was calculated by methods essentially identical with hers. During conversations with Prof. Selim Khamis of the Economics Institute of this University, it was pointed out that this procedure was of dubious validity when dealing with ratios, and for accuracy, a special series of formulae, specifically designed for ratios [4] should be used. Several series of data were recalculated upon this basis and the conclusion was drawn that the changes so produced either strengthened or did not materially affect the ideas exploited below.

It was found that whenever a large number of different organs were measured, a high level of significant and very significant differences were present between most species. In an attempt to better understand these results, a series of populations of *Entomobrya nivalis* and *Entomobryoides purpurascens* were measured and treated statistically. It was found that the levels of difference between many of these populations were indistinguishable from those between most species. Of the cases where the differences between species were clearly distinguishable from those between populations, all, save one, dealt with

forms so widely separated taxonomically that the ratio differences were of no real value.

A further point illuminated in this study was the relationships between the common pattern forms of *E. nivalis,* i.e., pattern A—usually called typical *E. nivalis* and pattern B—usually called *E. multifasciata.* The various populations were so divided that each population consisted solely of pattern A or pattern B. There was no correlation between the ratios and the type of pattern. The frequency of significant and very significant ratio differences between populations of *E. nivalis* was as follows: between A and B, very significant differences—7, significant differences—9; between A and A or B and B, very significant differences—7, significant differences—10.

Conclusion

The evidence, described above, indicates that the difference among organ-body ratios between some populations of Collembola are of such a high level as to be difficult to distinguish from those between species. This fact combined with the great changes in such ratios during growth, already exploited by Agrell [1] and Denis and Jeannenot,[2] make the utilization of such ratios as specific characters a doubtful taxonomic procedure. It can be argued that these cases are peculiar to the genera studied, but until a sufficient number of studies are available upon other groups, we have no basis for such an assumption.

It can also be argued that a sufficiently wide selection of specimens from different populations would also overcome these difficulties; but, this has not been customary in the past, and because of the rarity of collections, it is not possible for the huge majority of species.

Literature Cited

1. Agrell, I. 1948. Arkiv för Zoologi, Stockholm, 41 (12): 1–35.
2. Denis, J. R., and Jeannenot, F. 1951. Supplement Bull. Scientifique de Burgogne, No. 12: 1–20.
3. Jeannenot, F. 1952. Trav. Lab. Zoologie & Station Aquicole Grimaldi, Dijon, No. 1: 1–51.
4. Hansen, M. H., Hurwitz, and Madow. Sample Survey Methods & Theory. New York, 1953. 1: 165.

The Insect Fauna of an Iraq Oasis, The City of Baghdad

By NEAL A. WEBER, Swarthmore College, Swarthmore, Pa.

Baghdad, largest city in Iraq and existing on its present site on the Tigris River for some 1200 years, is situated centrally in the great palaearctic desert belt and is in effect a large oasis. The ancient and extensive irrigation which makes human life possible on the hot, level plains here has also permitted the presence of a far greater variety of plant and animal life than would otherwise be found. The date palm, so important in the economy of the country, forms large groves in peripheral areas and smaller groves or scattered trees occur throughout the sprawling city. Eucalyptus and citrus trees are planted extensively and Oleander (Apocynaceae-*Nerium oleander*) is the common hedge. Many people have rose gardens rivalling in beauty any to be found elsewhere; and it is a local custom to have well-kept and constantly irrigated gardens in which the hot evenings are spent. The mild winter climate with snow unknown and frosts uncommon permits bananas to survive occasionally in sheltered gardens.

The annual rainfall averages 134 mm. (five inches), nearly all falling in the five cool months (November-March); the remainder of the year is virtually rainless, with usual maximum temperatures over 37.8° C. (100° F.). Temperatures of 45° C. (113° F.) are common, with 43.3° C. (110° F.) the mean normal daily maximum in August when the dates ripen.

Various observers, mostly British, have recorded many species of Baghdad insects but have confined themselves mostly to their specialties and considerable gaps occur in the records of various orders due to the absence of collectors in them. The present brief survey attempts to give a general picture of the insect fauna and contains unpublished records which contribute to a filling-in of the gaps. No effort has been made to cover all of the orders. Several non-insect but related arthropods are included as an aid to picturing the fauna. Personal records are from September 1950 through August 1952.

Class CRUSTACEA—Order **Isopoda**

Pale sowbugs or woodlice live in the leafy trash of irrigations or under objects lying on the soil where some moisture is present. *Porcellio* and *Porcellionides* have been recorded.[1]

Class ARACHNOIDEA—Order **Scorpionida**

Scorpions are common; some are considered dangerous. *Buthus, Hemiscorpius* and *Orthochirus* are recorded.[2, 3]

Order **Solpugida**

These strange spider-like arachnoids with "mandibles" or chelicerae operating vertically as in vertebrates may occur about lights in the evening in their search for insects but are not commonly seen. *Galeodes arabs* Koch may be the species.

Order **Araneae**

Spiders, which forage freely over the Arctic tundra and in dense high mountain forests, are equally adaptable to desert conditions though generally paler in color. White spiders were taken on Oleander and a more ordinary-colored one ran over soil, June 22, which had a surface temperature of 54° C. (129.2° F.) at the time (3:20 p.m.). Only ants and mantids could tolerate this temperature here.

Order **Acarina**

Mites are not as conspicious elements of the soil litter as in other areas, such as Arctic tundra. They were taken as nymphs and adults on the common bat, *Pipistrellus kuhli* Kuhl, as were adult ticks (*Argas fischeri*) (det. Hoogstraal). The common dog tick, *Rhipicephalus sanguineus* (Latr.) (det. Bequaert), was taken from man, dogs and the common hedgehog (*Hemiechinus calligoni*).

Class CHILOPODA

No large centipedes have been noted. *Scolopendrella* and *Scutigera* types of small to medium size occur.

Class INSECTA

Collembola

Collembola occur in the soil litter of irrigations but are not numerous. Dry soil litter under trees may produce a few of small size.

Thysanura

Houses for the most part appear to become too hot for Thysanura, which are also not common elsewhere. By far the commonest type noticed is small, ovate and dark with the body produced as a shield over the legs, and living in ant nests (*Messor barbarus semirufa* André and *Cataglyphis bicolor orientalis* Emery).

Diplura

A *Japyx*-like species occurred in the nests of the above *Cataglyphis*.

Odonata

Odonata are generally scarce and appear to be confined largely to the vicinity of abandoned irrigation canals containing stagnant water. Large dragon flies may occasionally be seen hawking over the gardens and were seen to take winged ants (*Camponotus thoracicus xerxes* Forel) from an evening marriage flight.

Orthoptera

Orthoptera probably is the most important order of insects here. Baghdad, like other oases in the Middle East, has a large and varied fauna. The major groups are:

Blattaria: Blattidae. Three roaches are common in the houses, *Periplaneta americana* L., *Blatta orientalis* L. and *Polyphaga aegyptiaca* L.

Mantodea: Manteidae. The mantid, *Mantis religiosa* L., is a large species in gardens but the most striking in adaptation to a desert life is the genus *Eremiaphila*. The species are short, flattened dorso-ventrally, and run actively on long legs after their prey. The legs also permit them to keep the body above the hot ground. One was seen June 22 running in a light breeze at 3:20 p.m. over soil at a surface temperature of 54° C. (129.2° F.).

Saltatoria: Acrididae. Among the locust genera are *Anacridium, Platypterna, Ochrilidia, Schistocerca* and *Tropidopola. A. aegyptium* L. resembles the migratory locust (*S. gregaria* F.) but is larger and has a generally more even color and smaller spots. Both occur sporadically in the gardens. *Sphingonotus* (*savignyi* Sauss., *satrapes* Sauss. and *carinatus* Kr.) are adapted to extreme desert conditions but occur in the city.

Saltatoria: Tettigoniidae. The katydid, *Tettigonia viridissima* L., and *Decticus albifrons* L. may range over the desert as well as the local gardens.

Saltatoria: Gryllidae. The crickets, *Gryllus burdigalensis* Latr., *desertus* Pall. and *domesticus* L., are common in gardens and *burdigalensis,* or near, may be a minor pest in houses, eating holes in fabrics. *Gryllodes sigillatus* (Walker) is a house pest for the same reason and was also captured while eating a hole in the abdomen of a common live beetle, *Oenera hispida* Forsk.

Saltatoria: Gryllotalpidae. The mole cricket, *Gryllotalpa gryllotalpa* (L.) and much smaller species frequent gardens and may come to lights.

Chopard and Uvarov,[4] and the latter subsequently, have contributed much to a knowledge of this orthopteran fauna. Rehn [5] has identified many of the present collection.

Isoptera

Dr. A. E. Emerson has kindly determined the following new records of termites, which have seldom been noted in the Middle East:

Amitermitinae: *Amitermes vilis* (Hagan). The species was described nearly a century ago from alates from Iran, and the present collection offered the first opportunity to correlate the soldiers and workers with them. All castes of termites were emerging from one site April 23, 1952 at 8:30 a.m. following a heavy electric storm and shower during the night. The silty soil was left muddy and there was some standing water. They were emerging from bare holes no larger than necessary for their passage on top of a ridge bordering an irrigation canal. The few soldiers and many nymphs were milling about the exits

while the alates were hurrying out and fluttering off into the bright sunshine. As I passed through the city, more alates were noted flying at Sharjah and the Colleges of Engineering and Arts and Science shortly after 9:00 a.m. It was evident that conditions were appropriate for a general emergence. The common sparrows (*Passer domesticus biblicus*) were flying up and capturing them with difficulty. Where the termites were flying in the middle of the city, very few plants were available to them for woody food and they were doubtless emerging from wood beams of the predominately brick and tile buildings. This insect is, therefore, one of the most directly harmful of Baghdad species.

Amitermitinae: *Microcerotermes diversus* Silvestri. Termites in a date palm grove containing an understory of orange trees, and alates falling in a pool May 11, 1952.

Additional species taken elsewhere in Iraq which probably will be found in Baghdad are *Anacanthotermes vagans* (Hagan) from Basra, *Reticulitermes,* probably *lucifugus* (Rossi), from the Zubair desert and a new species of *Microcerotermes* from the desert near Baghdad.

(*To be continued*)

Entomological Departments

Believing such material to be of interest to its readers, ENTOMOLOGICAL NEWS herewith solicits articles similar to the one here presented and giving information on the organization and activities of entomologists in colleges, universities, museums, and in governmental and other groups.

University of Kansas

The Department of Entomology at the University of Kansas in Lawrence is one of very few separate entomological departments not a part of an agricultural school. It has, therefore, a nearly unique opportunity to emphasize non-agricultural aspects of entomology (although two courses in agricultural entomology and one in insect toxicology provide general training in these fields).

A considerable group of graduate students is currently enrolled, including individuals specializing in each of the principal entomological fields. Staff members are as follows: Ray-

mond H. Beamer (Professor and Curator of Snow Entomological Museum), Robert E. Beer (Assistant Professor), Kathleen C. Doering (Associate Professor), H. B. Hungerford (Professor), Charles D. Michener (Professor and Chairman of Department), and Robert R. Sokal (Assistant Professor).

Systematics is perhaps the field for which the Department is best known. Systematic research has been facilitated by the presence of the Snow Entomological Museum in the same building (Snow Hall) which is occupied by entomology and certain other biological departments. This Museum is financially a unit separate from the Department but because of shared personnel and close physical association it has remained philosophically close to the Department. Because of the interests of newer staff members, the collections of mites and of bees have grown particularly in recent years. The museum is, however, especially famous for its large collections of Homoptera and aquatic Hemiptera, assembled primarily through the efforts of Dr. Beamer and Dr. Hungerford. The availability of the Kansas Science Bulletin as a place of publication for the large works which so often result from systematic research has had an important influence on the growth of this type of research at the University of Kansas.

The systematic fields currently or recently investigated by staff members are as follows: aquatic Hemiptera (Hungerford); Cicadellidae and delphacine Fulgoridae (Beamer); Fulgoridae and Cercopidae (Doering); Apoidea or bees, saturniid moths, and chigger mites (Michener); Acarina or mites (Beer). Because of difficulties in their study a course on mites is offered by Dr. Beer and intensive work on these arthropods is being carried on.

Two staff members (Michener, Sokal) are particularly interested in problems and mechanisms of evolution; Michener's principal concern in this connection has to do with systematics in relation to evolution while Sokal's is in connection with ecology in relation to evolution, using biometry as one of the tools. Special course work provided to further understanding of evolutionary problems includes Speciation and Population Genetics, both offered in cooperation with Dr. J. A. Weir, a geneticist in the Department of Zoology, and Biometry, offered by Dr. Sokal.

The fields related to morphology receive special emphasis in course work, separate courses being given (by Doering) in external morphology, internal morphology, and insect histology. A course in insect physiology is also given.

Insect behavior and ecology receive considerable attention. Groups on which such work is going on or has been completed in recent years include sawflies and mites (Beer), aquatic hemiptera (Hungerford), and bees (Michener). Studies of the origin and development of social behavior in bees are receiving special attention from Dr. Michener and a group of graduate assistants. Much of the work being carried on by Dr. Sokal and his assistants on the origin, development, and genetics of DDT resistance in *Drosophila* and the housefly is behavioral in nature.

A University owned natural history reservation along the wooded bluffs of the Kaw River valley eight miles from Lawrence provides excellent opportunities for field ecological studies. A prairie area on the reservation and others near Lawrence are available for study although the region in general is hilly and wooded where not cultivated. Recent investigations by graduate students making use of the reservation include studies of the biology and ecology of chiggers, of the ecology of centipedes and millipedes, and of the arthropod ecology of mammalian nests. A resident ecologist (Dr. Henry S. Fitch) on the natural history reservation provides help on all such studies.

The applied field of entomology that receives principal attention at the University of Kansas is Medical Entomology. Because of close working relationships with the Department of Bacteriology it is possible for graduate students to undertake transmission problems requiring extensive bacteriological work. Tularemia in particular has been the subject of several such studies. Problems in the biology and systematics of medically important arthropods are also encouraged; for example, there has been a long series of studies of chiggers conducted in this Department.

Other entomological offices on the University campus are those of the Entomologist of the Kansas State Board of Health (Richard Lyness) and of the State Entomologist, Southern Division of Kansas (Michener). The field work in connection with the State Entomologist's office is carried on by L. A. Calkins throughout the year and by Dr. Beer and others in summer.—C. D. MICHENER.

Current Entomological Literature

Compiled by VENIA T. PHILLIPS, Librarian

Academy of Natural Sciences of Philadelphia

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania pertaining to entomology, including all arthropods except Crustacea. Coverage will be world-wide as regards major contributions to systematics as well as for all papers on morphology, physiology, embryology, etc. In addition, for species from the Americas and the Pacific (Nearctic, Neotropical and Polynesian regions) all minor contributions to taxonomy, distribution, etc., will also be recorded.

This list gives references of the year 1954 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Bigelow, R. S. & C. Reimer—An application of the linear discriminant function to insect taxonomy. [43] 86: 69–72. **Brues, C. T., A. L. Melander & F. M. Carpenter**—Classification of insects: keys to the living and extinct families of insects, and to the living families of other terrestrial arthropods. [68] 108, 917 pp., ill. (k). **Doss, M. A. & J. M. Humphrey**—Index catalogue of medical and veterinary zoology. Suppl. 1. Authors A to B. Bureau of Animal Industry, pp. 1–317. Supt. of Documents, Washington, D. C., $1.00. **Grandi, G.**—"Introduzione allo studio dell'entomologia," Aggiunte e correzioni (successive alla pubblicazione dell'opera). [Boll. Ist. Ent. Univ. Bologna] 19: 263–306, 1952/53. **Hemming, F.**—Zoological nomenclature: Decisions taken by the Fourteenth International Congress of Zoology, Copenhagen, August 1953. [Science] 119: 131–33. **MacNay, C. G.**—New records of insects in Canada in 1952: a review. [43] 86: 55–60. **Swan, L. W.**—The ecology of arthropods associated with Photinis arbutifolia. [Stanford Univ. Abs. of Theses, 1951–52] 27: 153–55. **Voûte, A. D.**—Oecologische en chemische bestrijding van insectenplagen. [57] 15: 82–6.

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[Stanford Univ., Abs. Theses, 1951–52] 27: 149. **Swan, Lawrence Wesley,** 1922– .—Short biography. [Stanford Univ., Abs. Theses, 1951–52] 27: 155.

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Review

DIE BINNENGEWÄSSER. VOL. 20. CHIRONOMUS. By August Thienemann. xvi + 834 pp. Schweizerbart'sche Verlagsbuchhandlung. Stuttgart. 1954. Pr. RM 143.50, Bound.

This work forms Volume 20 of a series dealing with the subject of inland waters. The author presents data on the biology of the Chironomidae (Tendipedidae) and Ceratopogonidae (Heleidae). These data have been gathered from many sources, many of them from his own writings and that of his associates. Among the numerous topics treated may be mentioned adaptation to environment, food habits, respiration and oxygen consumption, parthenogenesis, intersexes in relation to parasitism, parasitism, types of habitat, distribution, and the importance of the immature stages as food for fish. The numerous text figures illustrate details of structure, the graphs and tables deal with the statistics on chemical analyses, influence of temperature, counts of larvae found in fish stomachs, etc. The volume closes with a literature list of 47 pages, a checklist of the Chironomid species mentioned in the text, and a subject matter index that includes also names of the fish studied.

The author, Dr. Thienemann, for many years Director of the Hydrobiological Station at Plön, and Professor Emeritus at the University of Kiel merits thanks for placing this great summary before the limnologists, ecologists, entomologists and students of the life of inland waters.—O. A. JOHANNSEN, Cornell University.

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This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

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German lepidopterist wishes to correspond and receive live material (eggs and pupae) in exchange for dried imagoes. Johannes Reichel, Koenigsberg, Krs. Wetzlar 16, Germany.

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Conopidae of the World wanted. Will pay 10¢ to $1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and Stizini (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspy, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

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